

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)



Applicant's or agent's file reference 4636/RH	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/QB 03/03434	International filing date (day/month/year) 06.08.2003	Priority date (day/month/year) 10.08.2002
International Patent Classification (IPC) or both national classification and IPC C03C17/00		
Applicant PILKINGTON PLC et al.		

1. This International preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 807 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☒ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 19.01.2004	Date of completion of this report 08.11.2004
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I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-9 as originally filed

Claims, Numbers

1-19 as originally filed

2-27 received on 23.04.2004 with letter of 20.04.2004

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

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IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees, the applicant has:

- ☐ restricted the claims.
- ☐ paid additional fees.
- ☒ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☐ not complied with for the following reasons:

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos. .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-27 yes
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-27 no
Industrial applicability (IA)	Yes: Claims	1-27 yes
	No: Claims	

2. Citations and explanations

see separate sheet

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To point IV

Non-unity

By amending claims 23-27 (amended set of claims 21-27 filed with the letter of 20/04/04) the non-unity objection during search is overcome and the requirements of Rule 13 PCT are fulfilled.

To point V

1) Reference is made to the following documents:

D1: WO-A-0224445

D2: WO-A-0170495

D3: WPI WORLD PATENT INFORMATION DERWENT, DERWENT, GB (0000),

D4: US-A-4190698

D5: WO-A-0110638

D6: GB-A-2 226 024 (TIOXIDE GROUP PLC) 20 June 1990 (1990-06-20)

D0 US-A-5 216 100 (GRONDIN HENRI ET AL) 1 June 1993 (1993-06-01).

2) In his letter of response, the applicant argues that in D4 too many compounds are disclosed as useful adjuvants one of which being sodium aluminate. That is true, however D4 (column 1, line 62- column 2, line 17) also discloses

- six preferred adjuvants for reducing the gradient of the time/temperature curve after intumescent has been completed one of which being sodium aluminate and
- that sodium aluminate is to be used as adjuvant in order to reduce the temperature at which intumescence is initiated and
- that of the inorganic adjuvants sodium aluminate is given the preference.

The applicant further argues that D4 is totally silent as to how the aluminate might be incorporated into the silicate interlayer.

D4 (examples I-III) discloses how the adjuvants are added, here the solution of hydrated sodium silicate contains the adjuvant.

The applicant argued that following the teaching of D4 no useful glazing can be produced. D4 relates to fire resistant screening panels wherein the intumescent layers act as fire resistant glazings in the glass laminates according to D4. In this context it is further noted that the applicant characterizes D4 (description page 1, 3rd paragraph) as disclosing fire resistant glazings.

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As regards claim 23 of the present application the applicant argues that D6 and D0 are irrelevant for the method of producing the solution of aluminate, a polyhydric compound and hydroxy-carboxylic acid which is added to the alkali metal silicate solution. This argument cannot be followed. As a general teaching D6 discloses a method for manufacturing clear zirconium aluminate solutions from which the subject-matter according to claim 23 of the present application differs only in that the solution comprises sodium aluminate instead of the zirconium aluminate according to D6. D0 relates to a method of producing stable sodium aluminate solutions wherein carboxylic acid and polyhydric compounds are used in the suspensions of sodium silico-aluminates and thus D6 and D0 are relevant for the production of the solution according to claim 23 of the present application.

The applicant is of the opinion that claims 1,17,21,22, and 23 are clear. However in these claims essential compounds and amounts of these compounds are missing and it is further noted that according to the examples specific compounds and amounts of these compounds are used.

**The applicant's arguments are not convincing and the objections as regards
Inventive step and clarity are maintained;**

3) Claim 1

The present application, claim 1, claims a solution wherein aluminate + hydroxy carbonylic acid is mixed with waterglass in order to improve the fire-resistance and the mechanical impact resistance properties of the glazing composition.

4a) Inventive step

Clear, stable aqueous solutions comprising

- an alkali metal silicate waterglass (Na_2O and K_2O water glass) and
- a hydroxy carbonic acid (tartaric acid, malic acid, citric acid, gluconic acid, lactic acid, saccharic acid) and
- optional a polyhydric compound (glycerol)

In order to achieve the stability of the solution and

- which are used as fire resistant glazing for glass aminates

are known from

D1 (page 1, 1st paragraph; page 2, 3rd paragraph- page 4, 3rd paragraph; example 1; claims 1-13),

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D2. (page 1, 1st paragraph; page 2, nd paragraph- page 5, last paragraph; examples 1-15; claims 1-23),
D3 (abstract).

4b) To combine clear, stable aqueous water glass solutions with an aluminate in order to improve the refractiveness of the layer and reduce the gradient of time/temperature curve after intumescence has been completed is known from D4 (column 1, line 13-68; column 2, line 11-17; column 2, line 67- column 3, line 8; column 4, line 7-20; claims 1-6).
The person skilled in the art whose aim is to achieve a stable, clear solution suitable for manufacturing of fire resistant water glass glazing exhibiting improved fire resistance would start from the teaching of D4 and take into consideration the solutions known from D1- D3 and combine them with an adjuvant known to improve the fire resistance, e.g. sodium aluminate as disclosed in D4.

4c) Accordingly claims 1-22 of the present application do not fulfil the requirements of Article 33(3) PCT.

5) Clarity Claim 1

It is clear from the description on pages 2, nd paragraph- page 4, last paragraph, examples 1-5

that the following features are essential to the definition of the invention:

- (1) Specific ratio of the $\text{SiO}_2:\text{M}_2\text{O}$ in the waterglass.
- (2) The water soluble aluminate is partly neutralised with an hydroxy carboxylic acid , the thus neutralised solution is then mixed with the waterglass (product-by-process).
- (3) A specific amount of aluminate, specific ratio silicon:aluminium in the mixed solution.
- (4) Specific ratio (wt) of silica:alkali metal oxide in the mixed solution.
- (5) Specific % of solids in the neutralised aluminate solution.
- (6) The neutralised aluminate is produced via specific steps (ph 9-11 with reaction temperature of below 50°C).

Since independent claim 1 does not contain these features it does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of

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the invention.

6) Clarity 17,21 and 22

It is clear from the description on pages 5, nd paragraph- page 6, last paragraph that the following features are essential to the definition of the invention:

- (1) Specific water content in the dried layer.
- (2) Specific content of aluminium in the dried layer.
- (3) Specific thickness of the dried layer.
- (4) Specific thickness of the flat glass sheet.

Since independent claims 17,21 and 22 do not contain these features they do not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

7) Claim 23

The subject-matter of independent claim 23 and the respective dependent claims is concentrated on a method for producing a clear, stable solution comprising water soluble aluminate, hydroxy carboxylic acid and a polyhydroxy compound, wherein to a solution of an alkali metal silicate the following solution is added- a water soluble aluminate, a hydroxycarboxylic acid and a polyhydric compound.

7a) Inventive step:

D6 (page 2, line 1- page 4, line 4; examples 1-11; claims 1-31) disclose a process for producing an alkali metal silicate aluminates, wherein a clear solution comprising

- a water soluble sodium -silico- aluminate
- a hydrocarboxylic acid (e.g. citric acid)
- a polyhydroxy compound (e.g. glycerol)

is prepared

from which the subject-matter of claim 23 of the present application differs in that a solution comprising water soluble aluminate, hydroxy carboxylic acid and a polyhydroxy compound is added to an alkali metal silicate solution.

No prejudices or effect can be seen by separately adding the alkali metal silicate solution .

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7b) The person skilled in the art, who is concerned with water soluble aluminate, starting from the teaching of D0 would also take into consideration D6 and find out by simple testing the most appropriate solution compounds and the appropriate step for adding the compounds in order to achieve the desired alkali metal silicate solution..

7c) Accordingly claim 23 does not fulfil the requirements of Article 33(3) PCT. Dependent claims 24-27 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of inventive step (Article 33(3) PCT).

8) Clarity claim 23

It is clear from the description on pages 4/5 that the following features are essential to the definition of the invention:

- (1) Specific pH of 9-11.
- (2) Maintaining the reaction temperature below 50°C.

Since independent claim 23 does not contain these features it does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

ANNEX

- 21 A glass sheet having an interlayer according to any of claims 17 to 20 on one surface thereof.
- 22 A laminated glazing which comprises one or more interlayers according to any of claims 17 to 20 and two or more sheets of glass.
- 23 A method for producing a solution according to any of claims 1 to 16 characterised in that a solution comprising a water soluble aluminate, a hydroxycarboxylic acid and a polyhydric compound is added to an alkali metal silicate solution.
- 24 A method according to claim 23 characterised in that the aluminate is sodium aluminate.
- 25 A method according to either of claims 23 or 24 characterised in that the hydroxycarboxylic acid is citric acid.
- 26 A method according to any of claims 23 to 25 characterised in that the polyhydroxy compounds is glycerol.
- 27 A method according to any of claims 23 to 26 characterised in that the solution comprising the aluminate is formed by a partially neutralising the aluminate with the hydroxy carboxylic acid.

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